UNITED STATES
DEPARTMENT OF AGRICULTURE
DEPARTMENT CIRCULAR 320
Washington, D. C. August, 1924

THE VAN FLEET RASPBERRY; A NEW HYBRID VARIETY

GEORGE M. DARROW
Pomologist, Office of Horticultural Investigations, Bureau of Plant Industry

CONTENTS

	Page		Page
Introduction	1	Training	8
Origin of the Van Fleet raspberry	2	Propagation	8
Characterization	2	Rubus innominatus and its use in breeding	10
Disease resistance	3	Summary	13
Technical description	4	Literature cited	14
Reports on plants sent for trial	6		

INTRODUCTION

The horticultural varieties of raspberries grown in the United States are derived from three species, *Rubus idaeus*, *R. occidentalis*, and *R. strigosus*, and their hybrids (*4*)[1]. These three species are the only ones cultivated extensively in any part of the world. Horticultural varieties of *R. occidentalis*, the common blackcap, and *R. strigosus*, the common red raspberry, are the principal ones grown in the United States and Canada, while varieties of *R. idaeus*, the European raspberry, are grown to a slight extent on the Pacific coast and are of chief importance in Europe, Australia, South Africa, and New Zealand.

Three other species of raspberries are grown for their fruit to a very slight extent in the United States. These are the wineberry[2] (*Rubus phoenicolasius*), strawberry raspberry[2] (*R. illecebrosus*), and the yellow Himalayan[2] (*R. ellipticus*), but none are or seem likely to be important.

Three other forms are reported under cultivation in other parts of the world. In the Andes region of South America, Popenoe

[1] The serial numbers (*italic*) in parentheses refer to "Literature cited," at the end of this circular.

[2] The names wineberry, strawberry raspberry, and yellow Himalayan are here written without capitals, as they are not varietal names but are names applied, respectively, to all seedlings of these species. Strawberry raspberry was first written with a hyphen, being erroneously considered a hybrid. Later information indicates that it is a species. These names accord with those used in "Standardized Plant Names" (*1*).

96958°—24

(*6*, *7*, *14*) and others (*10*, p. 44) state that a black raspberry (*Rubus glaucus*) is of some importance in home gardens. In India Piper (*13*, p. 23) reported that *R. niveus*, which bears red, orange, or blue-black fruit, was cultivated about Bangalore. In Queensland, Australia, a hybrid between *R. rosaefolius* and *R. ellipticus* has been reported as under cultivation (*12*, p. 9). This has also recently been reported from Porto Rico, where it is of some value (5). These are all species of tropical or subtropical climates and are of interest in this country chiefly in the southernmost States.

Though no raspberries under cultivation in foreign lands seem promising for the temperate parts of the United States, many species of wild raspberries in temperate Asia have numerous characteristics that are attractive to the plant breeder. Many have extraordinary vigor of growth; others are resistant to diseases affecting varieties now cultivated; some have very large fruit; and certain ones have enormous fruit clusters. One with the latter characteristic crossed with the Cuthbert raspberry has given a hybrid, the subject of this circular, which seems to be valuable. This hybrid distributed for testing under the tentative designation "Van Fleet" is here officially named Van Fleet.

ORIGIN OF THE VAN FLEET RASPBERRY

In November or December, 1907, seed of *Rubus innominatus* collected by H. E. Wilson (*11*, p. 175) in China was received by the Office of Foreign Seed and Plant Introduction. This species was described as having immense panicles of fruit. From this seed plants were grown which blossomed in 1910 at Chico, Calif. The late Dr. Walter Van Fleet, at that time superintendent of the United States Plant Introduction Garden at Chico, hybridized it, using pollen of the Cuthbert red raspberry. Forty to fifty plants were grown from the seed in 1911 at the Bell Horticultural Field Station, Glenn Dale, Md. One of these, now named Van Fleet, proved far superior to the others and has been propagated and distributed for trial. (Fig. 1.)

CHARACTERIZATION

Several qualities of the Van Fleet raspberry make it particularly valuable, and the following characterization is given to point out some of them:

Bush, more vigorous and productive than any raspberry now cultivated, producing 8 to 16 canes growing 8 to 20 feet in length when 2 years old (fig. 2); free from anthracnose and other common raspberry diseases; hardy at Washington, D. C., foliage free from leaf-spots; flower clusters variable in size, many having 100 to 200 flowers or even more, practically all of which set fruit (figs. 3, 4, and 5). Fruit medium in size (fig. 6), soft, but does not decay as quickly as fruit of other sorts; in color medium, slightly dull red; subacid; only good in dessert quality when eaten out of hand but excellent with cream and sugar; seeds much smaller than those of ordinary raspberries; ripens after other red raspberries are gone and continues in season about five weeks.

In 1922 and 1923 the last picking of the Cuthbert and the first of the Van Fleet variety occurred on the same date. The individual berries mature quickly after they begin to color and fall off when overripe, making picking necessary every second or third day. Many 2-year-old bushes have borne 5 to 10 quarts each, and older bushes still more.

The weak points of this variety are the medium size of its fruit and its softness. Its strong points are the vigor, health, and productiveness of the bush, its late ripening season, and its adaptation to conditions in the Southern States. It probably is not suitable for a general market berry, but is of value for home use and local markets and should extend raspberry growing south of its present range to northern or central Florida. At Washington, D. C., it is one of the hardiest raspberries, if not the hardiest. It starts growth early in the spring, and even though hard freezes have occurred at Bell station after 4 to 6 inches of growth had been made, it has matured a full crop. In 1923 canes of the Cuthbert variety were killed to the

FIG. 1.—The original bush of the Van Fleet raspberry as it appeared in September, 1918. It was grown from seed planted in 1911. Photographed at the Bell Horticultural Field Station

ground, while those of the Van Fleet close by were uninjured. The new variety has withstood temperatures below zero at Washington and was uninjured during the winter of 1922–23 at South Haven, Mich., and Geneva, N. Y. It also withstands the summers in the South, growing vigorously in Florida, Georgia, and South Carolina.

DISEASE RESISTANCE

The Van Fleet raspberry has been grown in plantations with many other varieties and has shown notable resistance to diseases injurious to raspberries. Most striking is its freedom from leaf-spot (*Septoria rubi*), which is especially serious in the southern limits of raspberry growing and seems to restrict the growing of this fruit in

the South. Though many varieties growing near by have been entirely defoliated, only a trace of leaf-spot has ever been noted on the Van Fleet raspberry. This exemption from all leaf-spots has been noted in all regions where it has been observed and tested. Other varieties near by have had injurious attacks of anthracnose (*Gloeosporium venetum*) and raspberry leaf rust (*Pucciniastrum americanum*), from which this variety has also been entirely free so far. Several thousand bushes of the Cuthbert variety adjacent

FIG. 2.—Plants of the Van Fleet raspberry grown from buried cane cuttings in 1921. Photographed in April, 1923. The bush in the foreground is supported by a stake about 4 feet high. A stake 5½ feet high would be preferable. The second and fourth plants are not supported, and the canes are breaking over

to the Van Fleet had a 100 per cent infection of crown-gall, but no affected plants of this variety have yet been found. It is not possible to claim a high degree of resistance to crown-gall without extensive trials, yet some resistance seems to be indicated.

Cane blight (*Coniothyrium fuckelii*) has never been injurious to the Van Fleet variety though causing serious damage to adjacent black raspberries.

Two plants have been destroyed, one of which was known to be affected with mosaic disease; the other was suspected.

TECHNICAL DESCRIPTION

The following is a technical description of the Van Fleet raspberry:

Fruits round to oblate, medium size, borne in panicles of varying size, several lower ones having 100 to 300 fruits, dropping when overripe; drupelets medium

size, jasper red [3]; pedicels slender; calyx medium size, glandular-hairy, inclosing the fruit until it ripens; flesh rather soft, very juicy, but not decaying as quickly as most sorts; seeds very small, not as hard as those of other varieties; flavor subacid with slight aroma; quality good.

Bush tall (6 to 8 feet), very vigorous, upright, becoming spreading in autumn when the turion [4] tips seek the ground; propagating by tips in September and October at Washington, D. C., sparingly by suckers, which are rare the first season, becoming more numerous in later years; very productive, upwards of 20 quarts being picked from mature bushes; resistant to the common leaf-spot (*Septoria rubi*) and to all other leaf-spots where tested, to anthracnose (*Gloeosporium venetum*), to leaf rust (*Puccinia strum americanum*), to cane blight (*Coniothyrium fuckelii*) and to crown-gall. One plant is known to have had the mosaic disease, while seedlings of the Van Fleet variety seem very susceptible to it.

FIG. 3.—Part of a fruiting branch of the Van Fleet raspberry, showing its great productiveness. This branch bore more than 200 berries, and many such branches occur on a plant like that shown in Figure 4

Canes stout, long (8 to 15 feet), numerous, often about 15 on two-year-old plants, recurving, terete, red, glossy, glabrous; prickles short (one-twelfth to one-eighth inch), slender with thickened base, straight, sharp, medium in number (6 to 10 to the inch), red; winter buds large (one-fourth to one-third inch long), obtuse, spreading at an angle of 30° to 45°. Leaves appearing very early in the spring, deciduous very late in autumn, very large, with three leaflets; leaflets broadly ovate, cordate, acute, medium to thick, above dark green, somewhat glossy, slightly puberulent, especially along the veins, below grayish hoary, doubly serrate, the terminal leaflet somewhat three-lobed; terminal leaflet stalked, others sessile; petiole with few short straight prickles. Flowers small, rose colored, late, and produced through a long season.

---

[3] Ridgway, R. Color standards and color nomenclature. 43 p., illus. Washington, D. C. 1912.

[4] The term "turion" refers here to the new cane during its first season of growth, in contrast with that of the previous year's growth, which bears flowers and fruit. This is in accordance with the usage of Rydberg, in his monograph on Rubus in North American Flora, vol. 22, part 5 (8), and Brainerd, in "Blackberries of New England," Bul. 217, Vermont Agricultural Experiment Station, 1920 (2).

REPORTS ON PLANTS SENT FOR TRIAL

The following are brief reports of the behavior of the Van Fleet raspberry when tested at various points:

Gainesville, Fla., September, 1923.—I believe that the Van Fleet raspberry is a very desirable variety. It does well here, both on very light soils and on the

FIG. 4.—A close view of a part of a fruiting branch of the Van Fleet raspberry like that shown in Figure 3. Note the large number of berries on each axillary panicle

richer loams, of course doing better on the moister types of soil. It makes vigorous growth of healthy canes, which do not seem to be affected by the heat of the summer. The fruit ripens evenly and would be somewhat late, but has the typical red-raspberry flavor and quality, and is a very decided addition to our small fruits. . . .

I propagated about 40 plants from one plant by tip layering, and the parent plant has not fruited because of the heavy drain upon it.—*E. L. Lord, University of Florida.*

Blacksburg, Va., September, 1923.—I am inclosing a couple of prints of individual plants planted in the spring of 1922. . . .

The bushes fruited quite heavily this year, but owing to a drought, which prevailed over this entire section of the State for several weeks, the fruit did

FIG. 5.—Fruit cluster of the Van Fleet raspberry. (Considerably reduced in size)

not attain the same size as that which I saw on the trial grounds at the Bell station. . . .

Each bush developed some 15 to 20 good, vigorous canes this year. The plants are free from disease.—*F. A. Motz, Assistant Horticulturist, Cooperative Extension Work.*

TRAINING

Experience has shown that the plants should not be set closer than 6 by 8 feet, and it is thought that 8 by 10 feet is close enough. Tests have been made of various methods of training the canes, and under most conditions a stake projecting 5½ feet above the ground should be set by each plant in early spring, the canes tied to it, and cut off about 6 inches above the stake. Unsupported bushes become so heavy that many of them break over. (See fig. 2.) Pruning back to induce branching and to make the bush self-supporting has not been found practicable, because the new canes which develop before

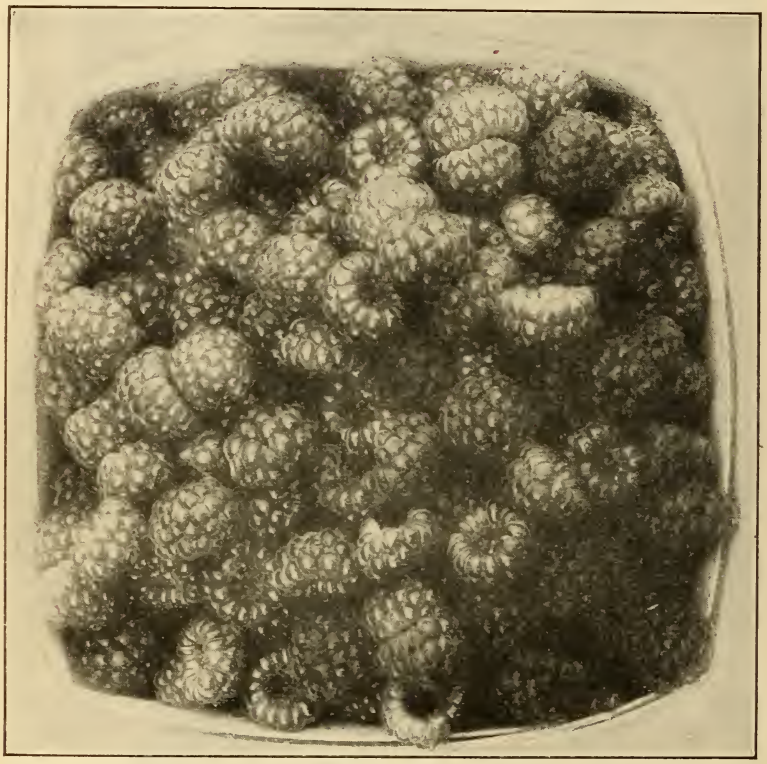

FIG. 6.—Pint basket of fruit of the Van Fleet raspberry

the fruit ripens make picking difficult and because it reduces the crop. The fruit ripens so late that the young canes will overgrow the old ones if the latter are cut back. When the old canes are removed after fruiting, the weaker new ones should be cut out and the remainder tied to the stake to prevent breaking over.

PROPAGATION

The Van Fleet sends up only occasional suckers, too few to be of importance in commercial propagation. Plants 2 and 3 years old have averaged about two suckers annually. Red raspberries make numerous suckers if all canes are cut off early in the spring. A few plants

of the Van Fleet variety were so treated in 1923, but with no increase in suckers that year. Some old bushes from which suckers have previously been dug have each produced several sucker plants. Propagation by this method is therefore slow.

Rubus innominatus, the seed parent, roots freely at the tips of the canes and as early in the fall as do black raspberries. The Van Fleet variety also roots at the tips but not as early in the season as black raspberries, which begin to root at the tips by the end of August at Washington, D. C., while the Van Fleet usually does not begin to root until late in September. Even tips buried in October often form good plants, and with reasonable care an average of 15 rooted tips may be obtained from each plant. More than this number have been secured both from plants set in the spring and from plants set the previous year. Twenty-six plants set in the spring of 1923 formed 6 to 49 plants each, with an average of 17 each, while

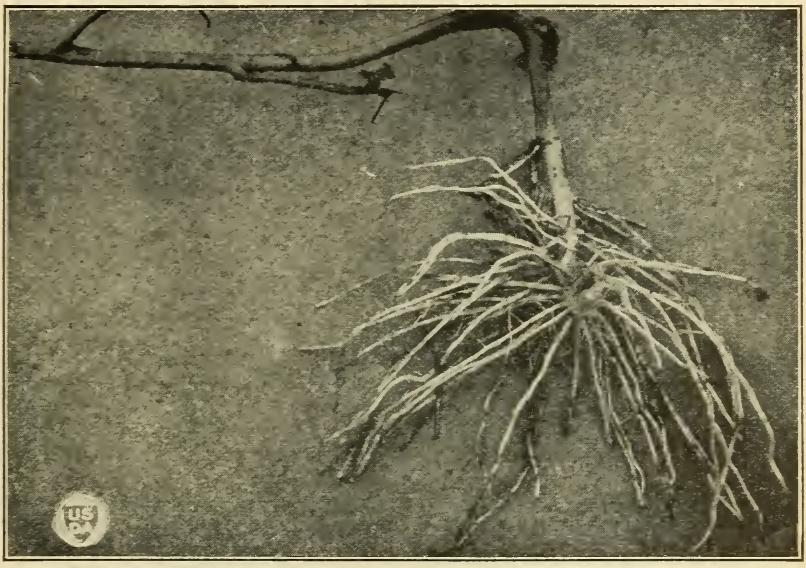

FIG. 7.—Rooted tip of the Van Fleet raspberry

19 plants set late in the spring of 1922 formed 7 to 36 plants each with an average of 18.

There is evidence that the tips start to root when the days are 12 hours or less in length and that propagation by tipping will be more difficult in the North than at Washington, D. C., for cold weather prevents much growth when the days are of this length. In the South propagation is likely to be more rapid than at Washington, because of the long growing season after the day length has become 12 hours or less. This is indicated by the fact that at the Florida Agricultural Experiment Station one plant sent to that station in early spring produced 40 new plants in the fall of the same year. A rooted tip of the Van Fleet is shown in Figure 7.

Root cuttings may also be used to propagate this variety. When the sucker plants were dug in the spring of 1923, the roots were saved and made into cuttings about 3 inches long. These were

graded roughly into sizes and planted by placing horizontally and covering 1 to 2 inches deep. It was noted that fully 50 per cent of the smaller sizes (under one-fourth inch), but a much smaller percentage of the large sizes, grew.

Ordinarily, by taking advantage of the three methods given above, propagation will be sufficiently rapid. However, Doctor Van Fleet found that they could be propagated with great rapidity by means of "buried cane cuttings" if given bottom heat. In midwinter the dormant canes were made into 2-eye or 3-eye cuttings, laid horizontally and buried about 1 inch deep in flats of sand, after which they were placed on a bench over pipes in a greenhouse, and an average of more than one good plant per cutting was secured. These plants propagated in the winter become large enough to produce as many as 15 tip plants each by fall. A row of the Van

FIG. 8.—Bushes of the Van Fleet raspberry propagated from buried cane cuttings in the early spring of 1921. Photographed in June, 1922, at the Bell Horticultural Field Station when the plants were in flower

Fleet variety propagated by this method is shown in Figure 8, about 16 months after the cuttings were made. Because of the number of canes produced by the Van Fleet, it is possible to multiply this variety more than a thousand-fold in one year by the use of this method. Neither hardwood cuttings, buried cane cuttings in the coldframe or out of doors, nor softwood cuttings have proved practicable. Canes of the previous season's growth were layered in early spring but new plants rarely formed. In most trials of these methods of propagation only a single plant was secured.

RUBUS INNOMINATUS AND ITS USE IN BREEDING

Wilson's description of *Rubus innominatus* sent in from China with the seed was as follows:

Sweet or semisweet bramble 4 to 12 feet. Stems not very prickly, clothed with short, soft pubescence; leaves 3 to 5 foliate, terminal leaflet often trilobed,

under side pale and clothed with short soft pubescence. Calyx glandular or eglandular. Fruit paniculate, red, of good size and fine flavor; panicle often a foot long. Common in thickets up to 4,000 feet everywhere in western Hupeh. In fruit very ornamental and should, I think, prove a useful plant to the breeder on account of its immense panicles (*11*, p. 175).

In Plantae Wilsonae, vol. 3 (*9*, p. 424), the distribution of *R. innominatus* is given as follows:

Kiangsi, Kuling, roadsides, common, alt. 130 m., July 28, 1907 (No. 1685; straggling bush). Western Hupeh: North and south of Ichang, thickets, alt. 300–1500 m., June and August, 1917 (No. 92, bush 1.3–2.6 m. tall, flowers rose-purple, fruit red). Yunnan, Mengtsze, alt. 1600–2000 m., A. Henry (No. 10922).

FIG. 9.—Two seedlings having the same parentage as the Van Fleet raspberry. The dwarf plant on the left is 21 inches high; that on the right has canes 6 feet 3 inches long

The plants of this species used by Doctor Van Fleet, grown from seed sent by Wilson, corresponded with the above description except that the fruit is small and not red, being nearer yellow, with the drupelets tipped with purple. The canes are very vigorous but not always hardy. The foliage is free from leaf troubles, and the fruit ripens much later than the Van Fleet variety, not commencing to ripen until August in 1923, while the Van Fleet began to ripen on July 8.

Of the other seedlings from the same cross made by Doctor Van Fleet some approached the Van Fleet variety in vigor but set fruit imperfectly. Others were very productive but were dwarfs (fig. 9). Many were not hardy and winterkilled. The fruit varied from straw yellow through the reds to black; some were quite acid and others

very sweet. Additional hybrids were made by the writer in 1920 between *Rubus innominatus* and the King, Antwerp, and Superlative varieties of red raspberry. Though several hundred seedlings were grown and fruited, practically all set fruit imperfectly.

FIG. 10.—Fruit cluster of a second generation selected seedling of *Rubus innominatus* × the Cuthbert raspberry. Photographed August 5, 1923

Seedlings of a very late fruiting plant from the cross made by Doctor Van Fleet in 1909 which closely resemble *Rubus innominatus* and fruited in 1923 have shown types that are more desirable, some beginning to ripen at the Bell station more than a month later than the Van Fleet raspberry (fig. 10). For the most part, they closely resemble *R. innominatus* but are much more productive and have finer fruit than the plants of that species used by Doctor Van Fleet.

SUMMARY

The origin is recorded of the Van Fleet raspberry, a hybrid between *Rubus innominatus* and the Cuthbert red raspberry.

Attention is directed to the following points of superiority of the Van Fleet: Vigor of plant and productiveness; freedom of its canes and foliage from most common diseases; a ripening season beginning with the last of the red raspberries and continuing for four to five weeks; its small seeds; and its apparent adaptation to conditions in the Southern States.

Weak points of this variety: Medium size and softness of fruit.

It is considered promising for home gardens and local markets from New York and southern Michigan southward to northern Florida, and Louisiana. It is considered especially desirable in Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida, States in which raspberries are not commonly grown.

A system of training adapted to this variety is suggested, and methods of propagation that have been worked out are described.

LITERATURE CITED

(1) American Joint Committee on Horticultural Nomenclature.
1923. Standardized plant names, prepared by F. L. Olmsted, F. V. Coville, and H. P. Kelsey. 546 p. Salem, Mass.

(2) Brainerd, Ezra, and A. K. Peitersen.
1920. Blackberries of New England—their classification. Vt. Agr. Exp. Sta. Bul. 217, 84 p., illus.

(3) Darrow, G. M.
1917. Raspberry culture. U. S. Dept. Agr., Farmers' Bul. 887, 44 p., illus.

(4) 1920. Are our raspberries derived from American or European species? *In* Jour. Heredity, v. 11, p. 179–184, illus.

(5) Griffith, J. P.
1923. Developing a new raspberry for Porto Rico. *In* Porto Rico Progress, v. 21, no. 51, p. 8.

(6) Popenoe, W.
1921. The Andes berry. *In* Jour. Heredity, v. 12, p. 387–393, illus.

(7) 1922–23. Rubus glaucus Benth. Rosaceae. *In* U. S. Dept. Agr., Bur. Plant Indus. Inventory no. 53, p. 33, 1922; 62, p. 26; 64, p. 14; 65, p. 87; 66, p. 65, 68, pl. 5, 1923.

(8) Rydberg, P. A.
1908–13. Rosaceae. *In* No. Amer. Flora, v. 22, p. 239–480.

(9) Sargent, C. S.
1917. Plantae Wilsonianae. v. 3. Cambridge, Mass.

(10) United States Department of Agriculture. Division of Botany.
1899. Inventory of foreign seeds and plants imported, no. 2, 94 p.

(11) ——— Bureau of Plant Industry.
1908. Seeds and plants imported . . . Inventory no. 13. U. S. Dept. Agr., Bur. Plant Indus. Bul. 132, 192 p.

(12) 1909. Seeds and plants imported . . . Inventory no. 17. U. S. Dept. Agr., Bur. Plant Indus. Bul. 153, 58 p.

(13) 1913. Seeds and plants imported . . . Inventory no. 30. U. S. Dept. Agr., Bur. Plant Indus. Bul. 282, 99 p.

(14) ——— ——— Office of Foreign Seed and Plant Introduction.
1922. Rubus. *In* Plant Immigrants, no. 199, p. 1818–1819.